

PATENT SPECIFICATION (11)

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(54) UNIT FOR TREATING AND FEEDING LIQUIDS, PARTICULARLY WATER

(71) We, VITCO PATENS A.G., a company organised under the laws of Liechtenstein, of Mauren, Liechtenstein, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a unit for treating and feeding liquids, in particular water.

Many industrial processes, for example those relating to the making of drinks, to photographic development, boiler water supply, and water for electric batteries, require the constant feed of water previously treated by particular methods which may include dechlorination, removal of lime, desulphurization, deodorization and similar processes.

In the known art, the above aims are achieved by the use of separate individual components such as mechanical filters, electrovalves for water, water treating elements and containers, pressure switches, supply tanks with ball cocks, etc.

The assembly of the individual components and the connection thereof, not being prearranged, is usually accompanied by a certain number of drawbacks such as:

- (1) A rather complex assembling apparatus is often required;
- (2) The possibility of a logical modular sequence in installation is not permitted;
- (3) The arrangement of the individual separate elements or components requires in general a lot of space;
- (4) The interconnection of the individual components requires costly adapting solutions;
- (5) The various components, owing to their different functional characteristics, are often difficult to adapt one to the other or to the water supply system they are inserted into.

Further drawbacks in the units of the already known kind include:

- (6) The danger that the connection of the various components to the water supply system results in a flow which is in excess of

that allowed for the filtering means of the treating unit;

(7) The difficulty of drawing pure treated water from the normal open-top collection containers and tanks, as the treated water is constantly in contact with impurities in the atmosphere;

(8) The difficulty of changing the type and/or number of the treatment cartridges in the treating devices when required by a change in the chemico-physical characteristics of the water in the mains supply, such a possibility not having been preventively studied in the known units.

The preferred embodiment of present invention to be described aims to obviate the above outlined drawbacks and in particular aims to:

(a) Facilitate and maintain by means of a very compact modular construction and in a limited space all the possible interconnections between the various components (mechanical filters, electrovalves, liquid treating elements complete with cartridges, pressure switches, supply tanks etc.), ensuring at the same time the very simple assembly thereof. In addition, the said modular construction makes it possible to combine units comprising different treating elements and supply tanks in series, resulting in compact groups simply connected together and at the same time space-saving, ensuring still further, owing to the modular construction of the whole, the easy replacement and substitution of the treatment cartridges whenever required because of the already mentioned reasons;

(b) Control in a very accurate manner the desired flow rate of liquid at the circuit outlet by means of a control system inserted into the circuit after the treating devices, avoiding in this manner the possible variations which may occur owing to the treating processes;

(c) Control the flow through the unit as a function of the liquid pressure by means of control devices inserted upstream of the treating devices, so that the latter are always operating in the best conditions required by their functional characteristics;

(d) Obtain at the outlet unpolluted liquid, such as water, because the liquid contained in the collection tank at the downstream end

of the circuit does not come into contact with any impurity.

The present invention provides a liquid-treatment unit comprising a liquid inlet means, a manually operable supply valve to manually control liquid flow from said liquid inlet means, a mesh filter in said supply valve, a flow control device downstream of said mesh filter, a liquid-treatment apparatus comprising a first tank connected downstream to said control device and having a liquid-treatment cartridge therein for treating the liquid received in said first tank, a second tank vented to the atmosphere connected to said first tank for receiving liquid treated in said first tank, liquid-level control means for maintaining a constant liquid level in said second tank comprising means for sensing the level of the liquid in said second tank, and means responsive to said sensing means for controlling the supply of liquid to said first tank in dependence upon the level sensed in said second tank, said means responsive to said sensing means being provided upstream of said first tank.

An embodiment of the present invention will now be described by way of example, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a unit according to the present invention with some parts broken away to show detail;

Figure 2 is a section, partly broken away, through the unit along the line A-A of Figure 1; and

Figure 3 is a plan view of the unit.

Referring to the drawings, a support plate 1 is both the supporting and at the same time a connecting element for the whole unit.

To the support element 1 is connected by means of a right-angled metal bracket 2 a device 4 through which liquid to be treated and entering through a union 8, passes. The union 8 can be connected to a mains water supply for example.

The device 4 comprises mechanical mesh filters 3 for a first rough filtering step provided to protect the more delicate mechanisms, for example, electrovalves found at a later stage in the flow circuit. The device 4 is closed at the upper part by a plug 5 acting as manual control by means of a projection 6 in contact with a circuit closing and opening valve 7, so that it is possible manually to isolate the remaining part of the flow circuit for inspection purposes.

The device 4 has a spigot 9 which fits in a sealed manner into a sleeve 10 containing a flow control device 11 of known type, so designed that the said flow in the presence of pressure variations does not exceed that tolerated by the liquid treating devices.

The sleeve 10 is connected to a body 14 which contains two electro valves, inlet electrovalve 12 and outlet electrovalve 13,

the function of which will be described below.

The body 14 ends downwardly at a modular element 15 which, besides providing fastening points to the support plate 1, contains also the seat for a coupling 16 of a first tank including a liquid treatment cartridge 18, the coupling 16 including an inner passageway for passing the liquid through to the underlying cartridge 18 (to be described). The coupling 16 has grooves engageable by a spring clip 17 mounted by the element 15 for allowing quick connection and disconnection of the first tank and cartridge 18 from the body 4.

From the modular element 15 through the coupling 16, the liquid passes to the underlying liquid treatment cartridge 18, in which it is exposed to various desired processes.

The liquid, after completed treatment, reenters into the modular element 15 passing through a passageway 19 coaxially surrounding the inner passageway of the coupling 16.

The liquid then flows out through a coupling 20 which seats in the modular element 15 and conveys the liquid to further treatment steps where necessary, or to a storage system. The coupling 20 comprises a tube 22 connecting two such modular elements 15. The second one of the two elements 15 is identical in construction to the first one, and contains a seat for a coupling 20a corresponding to coupling 20 and a coupling 23 corresponding to coupling 16 of the first modular element 15 and fitted with the same locking and unlocking system including a spring clip 17.

The second modular element 15 which is analogue to the first one, has also a seat for another coupling 21. The modular element 15 can be adapted according to requirements to have the inlet for the liquid at the coupling 20a and the outlet at the coupling 21 or *vice versa*. If there is required a further treatment cartridge 18 after the first treatment cartridge 18 in the direction of flow, the first modular element 15 would be connected to the second element 15 and its associated treatment cartridge 18 by connecting coupling 20 to coupling 21 by means of a suitable tube. The fluid would leave the coupling 20a and could be conveyed through a similar tube to successive modular elements for further treatment steps if desired.

The last phase (and in the example illustrated, the second phase) of the flow process is that in which the liquid flows through the coupling 23 into a second tank 34, wherein the water is maintained at a controlled level and in which there is an overlying atmosphere.

The maximum level of the tank 34 is controlled by means of a float valve 24 fitted with a rod 27 acting on a switch 25 which controls in turn the flow of electric current to the inlet electrovalve 12 and outlet electrovalve 13 which thus open or close the flow circuit.

Inside the tank 34 there is another float

valve with a rod 28 which in similar manner acts on a distributor 29 connected to indicator means and/or discharge interrupting means when the liquid level falls below a pre-

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established level.
In the upper part of the tank 34 there is provided an inlet air duct with an air filter 30 for filtering out atmospheric dust and additionally a single-acting valve 31. In the tank
10 wall at a suitable height there is fitted an overflow discharge union 32 having a single-acting valve 33. In this manner, when the level of the liquid in the tank 34 is falling, the air will be drawn in through the filter 30, while, when the level rises, the air is discharged through the single-acting valve 33. This
15 latter point is most important especially when dealing with previously heated liquids to ensure that the vapour developed can at once find an outlet. In this manner, the pressure
20 inside the tank is maintained at a substantially constant level.

WHAT WE CLAIM IS:—

- 25 1. A liquid-treatment unit comprising a liquid inlet means, a manually operable supply valve to manually control liquid flow from said liquid inlet means, a mesh filter in said supply valve, a flow control device down-
30 stream of said mesh filter, a liquid-treatment apparatus comprising a first tank connected downstream to said control device and having a liquid-treatment cartridge therein for treating the liquid received in said first tank, a
35 second tank vented to the atmosphere connected to said first tank for receiving liquid treated in said first tank, liquid-level control means for maintaining a constant liquid level in said second tank comprising means for
40 sensing the level of the liquid in said second tank, and means responsive to said sensing

means for controlling the supply of liquid to said first tank in dependence upon the level sensed in said second tank, said means responsive to said sensing means being provided
45 upstream of said first tank.

2. A liquid-treatment unit according to claim 1, in which, in use, said sensing means develops an electrical signal when said level exceeds a predetermined level and in which
50 said means responsive to said sensing means comprise electrovalve means downstream of said control device for turning off and on the supply of liquid to said first tank.

3. A liquid-treatment unit according to claim 1 or 2 in which said sensing means comprises microswitches acted on by rods of float valves in the second tank.

4. A liquid-treatment unit according to claim 2 or 3 in which said electrovalve means
60 comprises two electrovalves connected to prevent liquid from entering said first tank when closed and to allow liquid to flow thereinto when opened.

5. A liquid-treatment unit according to any of claims 1 to 4 including a first vent in said second tank having a one-way valve and a filter for taking air into said tank when the liquid level therein drops, and a second vent
70 in said second tank including a one-way valve for discharging air from said second tank as said level of liquid therein rises.

6. A liquid-treatment unit according to claim 1 substantially as hereinbefore described with reference to the accompanying drawings.
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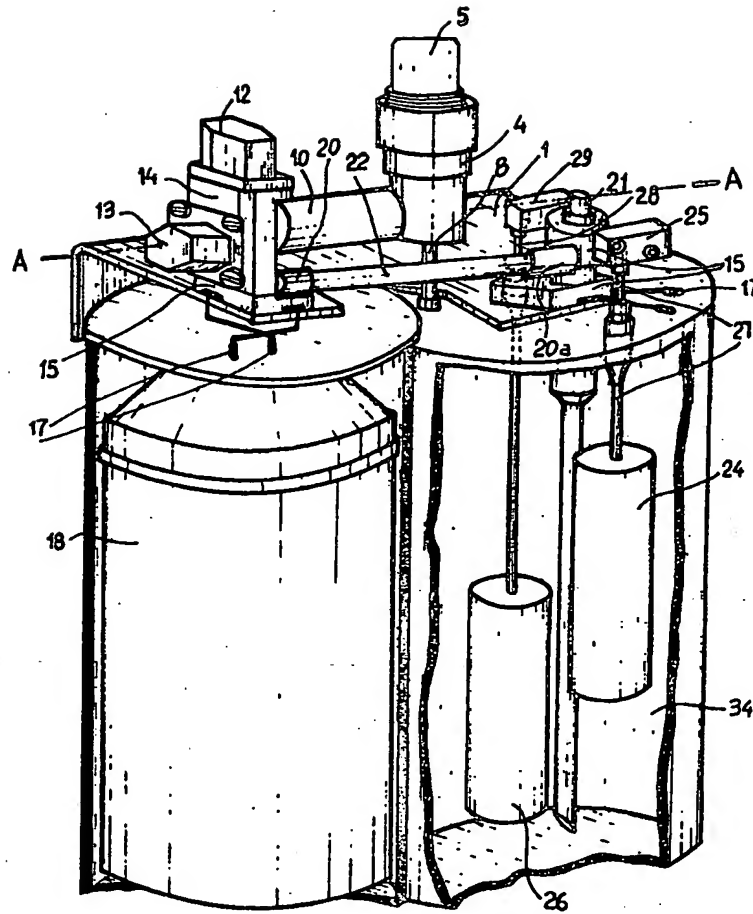
COMPLETE SPECIFICATION

3 SHEETS

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Sheet 1

FIG.1



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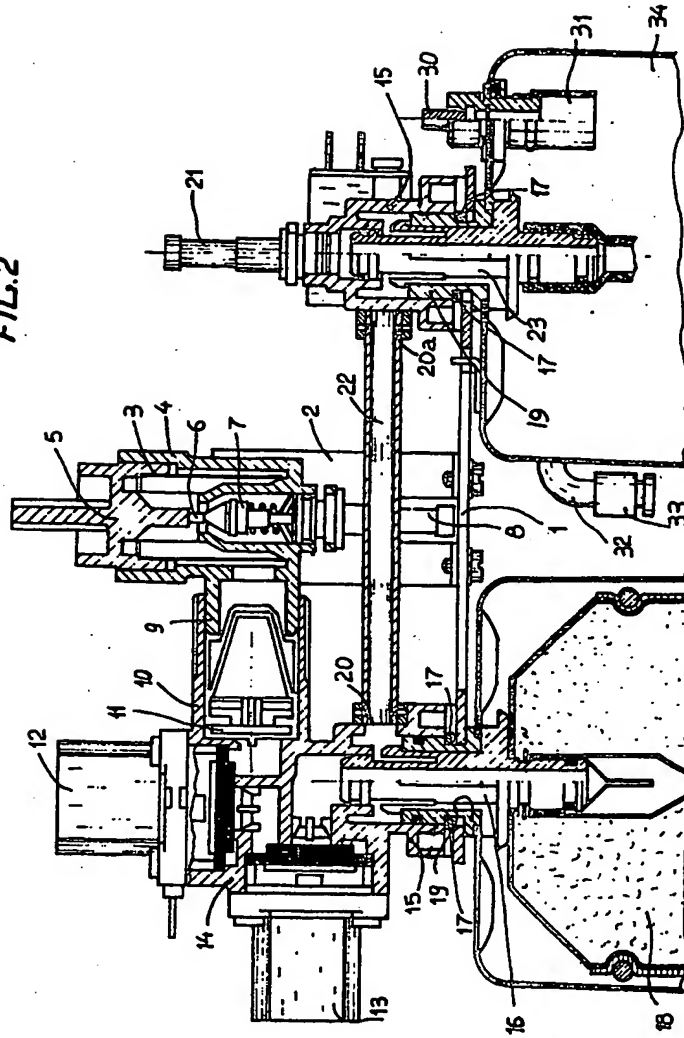
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Sheet 2

FIG.2



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Sheet 3

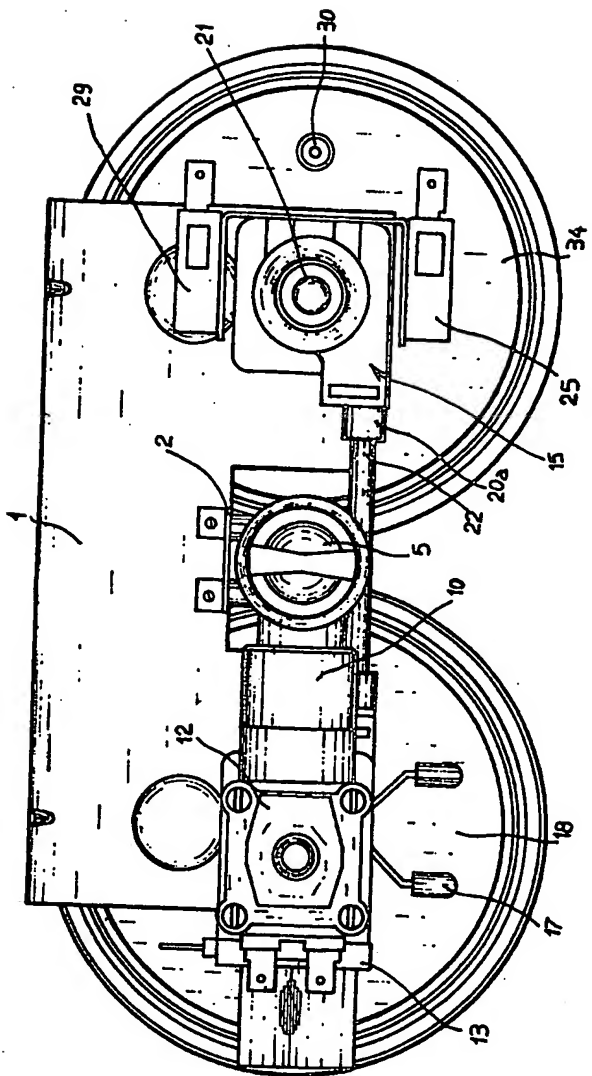


FIG. 3